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Co-production of ICT and children at risk: The introduction of the Child Index in Dutch child welfare

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ABSTRACT

This article studies the construction of children at risk in the introduction process of a novel ICT system in Dutch child welfare, the *Child Index*. This early warning electronic information system enables early reporting of children at risk to stimulate multidisciplinary collaboration among the different professionals involved with a particular child. We followed the introduction of the Child Index *in practice*. Our empirical analysis provides insight into the co-production of this ICT system and risk in child welfare practices. The analysis shows that the interaction between local and national, and disciplinary and organisational differences induces various constructions of risk, making the decision to signal and the act of signalling risk complex and the status of a signalled risk vague. Moreover, the analysis illustrates that the Child Index's goal of early signals for all children at risk does not fit professionals' daily practices and highlights the need to discuss whether the risk signalling ambitions of the Child Index are not a larger risk to children than the risks that are being targeted.

1. Introduction

Over the last three decades, practices of risk management and prevention in child welfare have changed in many countries. Risk used to be associated with identifying 'dangerous' families to protect children from abuse, but this focus shifted to a much broader approach of identifying early all children whose healthy development is at risk. Parton described this trend as a 'shift to prevention' (2006) and a shift 'from dangerousness to risk' (2010). Dutch child welfare has displayed a similar trend since the 1990s (De Winter, 2012; Keymolen & Broeders, 2013; Lecluijze, Penders, Feron, & Horstman, 2015), and, in the last decade, this development has intensified due to the introduction of information and communication technology (ICT) systems to identify children at risk. In the context of catastrophic incidents with children, such as murder, media attention and formal inquiries of child welfare by the inspectorate, policymakers promoted ICT as a tool for identifying children at risk early and improving professional collaboration (cf. Lecluijze, Penders, Feron, & Horstman, 2014). While several software programmes have been developed and introduced to that purpose on a local or regional level, in 2010, the Dutch parliament introduced a national early warning ICT system in child welfare: the 'Child Index'.[1] The accompanying Act implies that each Dutch municipality is obliged to organise and put into operation a local Child Index system, which have to be connected to one another. This network of connections is called the national 'Reference Index for Youth at Risk'.

The national ICT infrastructure of the Child Index implies that all professionals of the 'youth workforce' working with youth from 0–23 years old, including child and youth healthcare physicians, school nurses, social workers, mental health care providers, school care coordinators, general practitioners, youth psychologists and others, have to use a local Child Index system to 'signal' children at risk. Next to the material technology, the Child Index consists of social elements to support its introduction and functioning in practice, such as policy plans, the Act, training sessions, protocols and user manuals. Therefore, we consider the introduction of the Child Index a socio-technical trajectory: a complex process in which material and social elements are produced together in continuous mutual interaction.

Analysing the introduction of the Child Index as a socio-technical trajectory, this paper aims to answer the following question: how are

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[1] The term Child Index refers to an ICT system that brings together professionals' risk signals on youngsters. In practice, different local indexes are being used. In this article, we use the term local index to refer to one particular local system we studied, called 'Care for Youth'. The term national index refers to the national network that interconnects all local indexes. More details on the relation between the national and local indexes in the Netherlands are provided by Keymolen and Broeders (2013).

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children at risk constructed in the making of the Child Index? First, we explore previous studies on risk and ICT in child welfare and introduce our theoretical approach, which draws from science and technology studies. Subsequently, we explain our methodology and present our empirical analysis. Finally, we discuss the lessons that can be drawn from our analysis of the Child Index case about the construction of risk in developing ICT systems.

2. Risk, ICT and child welfare: a constructivist perspective

Characterising modern societies as 'risk societies', the sociologist Beck pointed to the huge attention towards risk over the last decades (Beck, 1992). Currently, health risks have become a special object of concern. Screening programmes, health promotion programmes, lifestyle interventions and genetic tests pop-up like mushrooms and shape health in terms of risk. In 1993, Deborah Lupton already stated: 'In public health the word "risk" as a synonym for danger is in constant use' (Lupton, 1993, p.425). In line with many other sociologists of risk, she emphasised that risk should not be viewed 'as a neutral and easily measurable concept, but as a socio-cultural concept laden with meaning' (p.426).

The rise of risk discourse in the field of child protection and child welfare has been studied from this perspective as well. Parton (1998), who explored this development in the UK extensively, criticises the focus in child welfare on risk instead of meeting children's actual needs. Because risk is being associated with objectivity and assumed to be calculable and predictable, he stresses the danger of overlooking the ambiguity and uncertainty of child welfare practices. In addition, Cradock studied 'how and why risk has rapidly become a central organising principle of child protection work' (Cradock, 2004, p.315). Risk became 'the unifying speech genre for all participants within the child protection apparatus' (idem, p.324), which means that child welfare workers came to see the life of all children through the lens of risk. Like Lupton, Cradock emphasises that risk calculations, although presented as value neutral, obscure the subjective process of moral judgement in child protection work.

In line with this risk discourse, policy makers have increasingly put the introduction of ICTs on the political agenda as a technology to enable early identification of at-risk children. In critical studies on this 'electronic turn' (Garret, 2005), three important issues can be distinguished. First, many authors critique the impact of ICTs on child welfare work because it changes the nature of child welfare work, reduces professionals' work to informational activities and negatively affects relations between professionals, parents and children. Parton (2008a, 2009) articulates concern about 'the shift from a narrative to a database way of thinking and operating' (Parton, 2009, p.715) because ICTs might imply less attention for the relational and social dimensions of child welfare work. Pithouse et al. (2012) emphasise the changes regarding risk in child welfare in relation to trust. Their study on new risk management technologies in the UK's children's services shows how new ICT designed to reduce risks has 'the potential, paradoxically, to create new risks as well as do little to enhance public trust in the profession' (Pithouse et al., 2012, p.162). Based on the identified gap between the human dimension of the work and risk management through ICT, they argue shifting the balance back from system confidence to professional trust. In addition, Broadhurst, Hall, Wastell, White, and Pithouse (2010) criticise the increasingly formal and instrumental approaches to risk management in child welfare practices. They note that 'social work practitioners are obligated to comply with risk reduction technologies, but *informal* processes continue to play a critical role in shaping decisions and actions in this relationship-based profession' (Broadhurst et al., 2010, p.1046). They stress the need for attention to the informal logics of risk management in practice, namely the multiple, relational and contingent aspects of professionals' work practice. Of the studies mentioned, all stress the importance of acknowledging child welfare as a human practice, entailing relational aspects, moral dilemmas and trust.

A second theme in the literature about risk, ICT and child welfare is the making of 'electronic children' and the creation of new risks for children as well as professionals. The Netherlands was not the first country to introduce a Child Index. An ethnographic study of Peckover, White, and Hall (2008) in the UK explores the introduction of the national ICT tool ContactPoint, which, to a certain extent, is comparable to the Dutch Child Index. ContactPoint, which has been abolished in 2010, differed from the Dutch index in that it contained basic information about all children and an integral link to an existing e-assessment and referral tool. In addition to noting the 'mismatch between the "electronic child" in the Index and the real child known to the child welfare professional' (p.384), the analysis of Peckover et al. (2008) shows that the ICT creates a 'tension between "putting (data) in" and "going out" to see families' (p.391). Further, because professionals prefer to see families instead of recording their involvement, they themselves become 'at risk'. In addition, Hall, Parton, Peckover, and White (2010) analyse how UK's child welfare policies' focus on individual children results in the introduction of ICTs that separate children from their social context. They show how 'child-centric' ICTs increase the fragmentation of professional work and make professionals lose sight of a child's life within a family. Hall and colleagues stress the importance of taking into account users and their practices when designing ICTs to support professionals' work because the 'considerable work in user-centred design and human–computer interaction […] seems to be missing from current practices in child welfare.' (Hall et al., 2010, p.410).

A third theme that is discussed, relates to how new preventive policies' turn to ICT allows for screening, surveillance and control of the objects of policy, particularly being professionals, parents and/or children. Several authors warn of the negative consequences of the 'electronic eye' (Garret, 2004) and the rise of a 'preventive–surveillance state' (Parton, 2008b) or 'surveillance society' (Bellamy, 2011). Parton shows that the introduction of new ICT systems to monitor and exchange electronic information at an early stage changes the relationships and responsibilities of professionals, parents, children and the state (Parton, 2008b, 2010). A review of Bellamy (2011) on the plans of the new UK government to reverse the shift to 'surveillance society', explains that the nation-wide introduction of the UK index ContactPoint raised a lot of political debate about large-scale information gathering and intrusion of citizens' privacy. Consequentially, ContactPoint was closed down (Bellamy, 2011). In his analysis of the Dutch national Child Index and two other risk-based databases in Dutch child welfare, Schinkel (2011) notes that archival systems 'assess risks on the basis of deviations from the norm', allowing the production of 'governing images' of society. He argues that this 'current "archive fever" is a form of prepression that combines prevention and repression' (Schinkel, 2011, p. 367). Another Dutch study on the national Child Index by Keymolen and Broeders (2013) concludes that the ICT system entails unforeseen functions of control and becomes a vehicle for surveillance. Although it is mentioned that 'it is not unusual to ascribe some type of actorship to technology' (Keymolen & Broeders, 2013, p.46), assigning tasks, roles and values to a technology is not a neutral process and brings along new risks to professionals (limited autonomy) as well as children (privacy and safety).

The abovementioned studies approach the rise and consequences of risk in child welfare differently. Sociologists, such as Beck and Lupton, stress modern societies' occupation with risk and illustrate the use and power of risk discourse, but the way society and risk constantly interact with technologies in this process receives little attention. Studies on risk reduction technologies all point to ICTs' potential to change child welfare work practices, introduce new risks and stimulate surveillance. These studies more or less assume and reproduce the disciplining power of ICT. By contrast, whereas the earlier mentioned study of Peckover et al. (2008) on the introduction of a local child index in the UK recognises the critiques mentioned before, it provides

empirical data that take the edge of the other authors' concerns and warnings. It shows that in practice, child welfare work remains relational because ICT is not able to fully transform the nature of child welfare work and does not produce the dreaded consequences. The 'human mediation of technology' and 'technical mediation of the human agency' (Peckover et al., 2008, p.378) prevent this from happening. Next to Peckover et al. (2008), other authors also argue paying more attention to the interrelation between technologies and its users, like Parton (2008a), who suggests seeing the world as a human/technical hybrid to understand the impact of ICTs on professionals' practices.

However, studies that explore the introduction of ICT as a socio-technical process and analyse the interaction between ICT, child welfare and risk are still rare. Our study connects to this topic and adds to previous research by investigating the case of the Dutch Child Index as a socio-technical process in a multidisciplinary child welfare field. Because (Dutch) policy makers are increasingly inclined to introduce ICT solutions to prevent problems in children, the need to understand the interaction between technology, child welfare and risk is growing. To that end, we draw from the field of science and technology studies (STS).

The field of STS investigates the relationship between science, technology and society. The constructivist view within STS argues that technology shapes and is shaped by society. Following the complex and continuous interaction between technology and society in practice helps us to understand the construction of technology and its embedding in everyday practices (Jasanoff, Markle, Peterson, & Pinch, 1995). According to Latour (1987), rather than as the process of transferring ready-made technology to society, innovation should be studied as a process in which technology and society are both in the making. To interpret the complex interactions between technology and society, Jasanoff (2004) uses the term *co-production*: 'the proposition that the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it' (Jasanoff, 2004, p.2). From this constructivist perspective, technology is not given but rather socially constructed, just as society is technically constructed. As co-production implies that technology and society are produced together, a socio-technical process should be studied in a symmetrical way, which means that an innovation's success or failure may not be attributed to the technical or social factors beforehand. Empirically studying a technology in the making provides insight into the fruitful elements of the socio-technical interaction.

Drawing on theoretical and methodological insights from STS, we studied the introduction of the Child Index technology in child welfare practice as a socio-technical trajectory of risk construction. By empirically following the Child Index in practice, we aim to improve our understanding of the socio-technical processes in child welfare and the construction of risk in these processes. Examining stakeholders' positions, struggles and negotiations regarding signalling risk in the Child Index allows us to understand the extent to which the construction of risk affects the making of preventive ICT systems.

3. Method: following the Child Index in practice

This article is based on a four-year qualitative research project on the introduction of the Dutch Child Index in practice. In the Netherlands, each municipality is legally obligated to facilitate and offer a local index system, enabling the link to the national index to create a full network. Currently, three software applications offered by different providers are operational in Dutch child welfare practice. Although these local systems are organised slightly differently and have different names, their intentions and functioning are similar. According to the constructivist view, risk is a construct that comes into being in the interaction between technology and society. Following these insights from STS, studying the construction of risk in the introduction process of the Child Index requires an ethnographic approach in which the researcher closely follows the object under study in its natural setting. We followed the implementation process of a local child index system in practice between 2009 and 2013 in one Dutch province. Taking into account the importance of contexts for socio-technical processes, we studied this local child index in four municipalities located in different parts of the province differing in size, youth issues, and the time the implementation of the index started. Consequentially, some municipalities were introducing the index and training professionals at the time the fieldwork was being performed, while others were already using the system. However, as many professionals rarely use the system in their everyday practices and it is unpredictable when actual use will take place, data on professionals' use were gathered retrospectively via interviews and relevant documents such as management reports. To obtain a feeling for the specificities of the process in this province and to find out to what extent contextual differences play a role, we also performed highly concentrated fieldwork through a small number of focussed interviews in another Dutch province ($N = 9$), working with the same system, and followed the developments regarding other local and national child indexes in the Netherlands ($N = 3$) as well as in the UK ($N = 5$).

To provide insight into the construction of risk, three qualitative data collection methods have been used. First, 58 semi-structured interviews have been conducted to explore the experiences of three different groups of actors involved with the introduction of the local Child Index in the four selected municipalities. In each of them, interviews were performed with professionals from the various organisations that implemented this ICT tool. 36 professionals were interviewed, including managers of professional organisations. Furthermore, 13 policymakers and managers working at the municipalities participated. A consultancy organisation was assigned to support and facilitate the introduction of the index on a provincial level, so the first author (IL) also spoke to 9 employees working on this project. While in the field, we also spoke to professionals from other regions. Moreover, focus groups were organised with youngsters ($N = 5$), parents ($N = 1$) and the employees of the local consultancy agency ($N = 1$). All respondents were collected via 'snowball sampling' (Atkinson & Flint, 2001). The interviews took place at respondents' work places and lasted between 1 and 2 h. Several themes were discussed during the interviews, including the introduction process of the child index; experiences with the index in practice; risk signalling; multidisciplinary collaboration; coordination of care and the roles of children, parents and politics. Although all of these themes were systematically discussed in every interview, the conversations were open enough to discussing other themes as well. All interviews were recorded and transcribed verbatim. Second, ethnographic observations enabled us to obtain a better picture of the implementation process of the Child Index. For three years, IL observed all of the meetings of the provincial steering group, dealing with strategic processes, and the provincial core group, concerned with tactical and operative issues. Furthermore, IL observed training sessions, follow-up training sessions, professional meetings, congresses, preparation activities for an evaluation, chain coordinator meetings and a child case meeting. Being there and witnessing professionals' attempts to deal with children at risk deepened our understanding of the construction of risk through the Child Index. Third, during the whole research period, relevant documents were studied to learn more about the continuous interaction between the Child Index, its users and context. Next to user manuals, brochures, protocols and covenants concerning the local Child Index under study, we also analysed relevant websites and other publications concerning the national and local Child Indexes, such as policy documents, evaluation reports, organisational notes, papers of preceding studies and newspaper reports.

To analyse the collected data, content analysis was performed (Hsieh & Shannon, 2005). Themes were identified and sorted through a systematic process of coding. After reading the interview transcripts and field notes, a first analysis of the data was performed through open coding in the qualitative analysis software program NVivo. Data fragments relating to the same theme were identified and labelled

with codes and subcodes. The initial codes corresponded to the themes that were most prominent during the interviews such as experiences with the Child Index technology, the meaning of signalling risks, professional collaboration, the process of implementation, the role of policy and politics, expectations of the Child Index, and its changes over time. While reading and re-reading the transcripts and notes, these initial codes were refined and grouped into categories. To further analyse these categories and guide our interpretation of the data we used theoretical concepts from STS, specifically the idea that technology and society interact and are therefore co-produced (cf. Jasanoff, 2004). To interpret the data in terms of co-production, the categories and accompanying codes related to the interaction between the Child Index technology and the construction of risk were analysed and interpreted again from that perspective and, if necessary, grouped into new categories.

While reading and re-reading all of the data, IL went through an iterative analysis process that generated new insights. The (intermediary) results of this process were independently reviewed and refined by the other authors and frequently discussed during project meetings. Moreover, the results of the analysis were presented to various groups of actors at small conferences and workshops so that reactions could be included in the analysis. Following the introduction of the Child Index in practice and analysing it as a socio-technical trajectory, while paying equal attention the technical (ICT) and the social (risk) elements of the process, enabled us to relate our findings and make visible the co-production between the Child Index and children at risk. In this paper, we will present several illustrative episodes of co-production providing insight into the construction of risk.

Taking into account that data were collected in four municipalities and two Dutch provinces, the many differences between these settings did not appear to influence the patterns that dominated the introduction process of the Child Index in all settings. Despite the heterogeneity in research settings, the data-analysis demonstrated that the theme of risk construction played an important role in each setting. Pointing to the size of a municipality, specific youth problems or other characteristics of the research setting did not help to understand the construction of children at risk in the making of a Child Index. In the next paragraph, we explain how interaction between risk construction and the Child Index can be understood.

4. A new technology and new risks

The Dutch Child Index was developed to prevent problems among children by signalling children at risk in an early phase and to stimulate professional collaboration. The fact that many professionals are involved with a family in which a child has died from murder or neglect was a major argument for building a 'youth following system'. Strengthened by these high-profile incidents, local authorities started developing digital 'signalling systems' that authorised professionals of the 'youth workforce' to 'signal' at-risk children. This index is not a tool for collecting health data, but is designed as a system through which a broad range of professionals can inform each other that they consider a child to be at risk. This implies that it shows THAT-information, indicating whether there is a risk, but does not contain any information on the characteristics or content of the risks, so called WHAT-information. Each signalled child receives a personal page in the system, only showing the child's name, day of birth, address, citizen service number, and the name(s) and affiliation of the professional(s) who logged their name against this child. In the case of two or more signals, the system creates a match, and professionals automatically receive an e-mail indicating that they have to contact each other and discuss the at-risk child to plan timely interventions. Moreover, some local systems automatically appoint one organisation that has to provide a chain coordinator who becomes responsible for the coordination of care (Zorg voor Jeugd, 2010).

Simultaneously, the Ministry of Youth and Family started developing a national Child Index. Its policy programme entailed that local child indexes would be interconnected through the national (umbrella) Child Index, and linked to the future medical Electronic Child Record, and the planned Centres for Youth and Family (Programmaministerie Jeugd en Gezin, 2007). In line with this, in 2010, a new statutory regulation called the 'Reference Index for Youth at Risk' was included in the Dutch Youth Care Act. Thus, the Child Index operates simultaneously on local and national levels.

The Child Index was presented as a simple ICT system that enables professionals to signal children at risk without sharing any information about the nature of the risk. Much has been invested in implementing this ICT tool in practice. From a STS perspective, this process can be framed as a socio-technical trajectory in which both the technology and the risks that have to be signalled are 'in the making'. In other words, the Child Index and children at risk are co-produced, and professionals are not just passive agents in this process but actors. In the next paragraphs, we will explore how this process takes place.

4.1. ICT systems and the construction of children at risk

The specific local ICT system that we studied, named 'Care for Youth', offers two functions to enter children at risk. Professionals acquainted with a child because (s)he is a client of the organisation can enter '*a chain registration*'.[2] Professionals who are worried about a child because they 'observe a risk for a healthy […] development' (Zorg voor Jeugd, 2008) can register '*a signal*'. To indicate a signal's level of urgency and time span within which professionals have to act, the local system initially distinguished three codes: urgent, high and low. Because applying this distinction appeared to be inconvenient in practice, this classification would be changed a couple of years later; however, at the introduction of the Child Index, its website and user manuals stated that *urgent* indicates 'serious problems [that] seriously threaten' a youngster's development; *high* corresponds with 'problems' and code *low* is appropriate when 'a suspicion exists that problems occur through which […] development is possibly threatened' (Zorg voor Jeugd, 2009).

To introduce this local index province widely, the project organisation that led the implementation developed different strategies. Next to a concept list, user manual and website, training sessions were offered to all professionals teaching them the mechanics of the system. In these sessions, trainers emphasised using the term 'signalling' to refer to the act of entering a child at risk and avoiding the term 'reporting' to prevent confusion among professionals and parents with the phenomenon of 'reporting child abuse',[3] which is an established expression in the Netherlands. Moreover, professionals were instructed to decide upon registering children based on their own professional judgement. Notwithstanding these instructions, from the start, the system raised many questions. Professionals especially struggled with the question of when to use the system to indicate a child at risk.[4] A social workers'

[2] Various local Child Indexes are being used in the Netherlands. All software applications contain the basic functionality of 'signalling' risks, indicating that a professional is concerned and considers a child to be 'at risk'. Some have other functionalities as well, such as an option to enter pre-signals or managerial functions to monitor professionals' actions. The local index we studied contains the extra function of 'chain registration', which indicates a professional's involvement with a child. Furthermore, it automatically appoints a chain coordinator who becomes responsible for the coordination of care.

[3] Although there is no system of mandatory reporting in the Netherlands, all professionals of the youth workforce are obliged by law to use a 'reporting code'. When the steps of this code are taken and child abuse is suspected, professionals can decide to report this to the Advice and Reporting Centre on Child Abuse (VWS, 2012). Additionally, a risk signal can be entered in the Child Index. Regarding index use, professionals have the duty to consider whether a child is at risk, but entering risks is not mandatory.

[4] A similar finding is reported by Peckover et al. (2008). Their study on a local child index in the UK demonstrates that 'there were also difficulties in deciding which children a practitioner should log her/his name against' (p.386). In practice, professionals' decisions about when to use the index were shaped by managerial imperatives, resource availability, practitioner time, and notions of accountability and risk.

team leader wonders, 'Do you have to register everybody now or do you only send signals if you are concerned?' (interview M2). A youth healthcare physician adds: 'when do you consider it serious enough to enter it in [the index]?' (interview O3). A youth nurse also doubts when to use the index in her daily work: 'When are you going to report? For the other organisations there might be other criteria than for us as youth healthcare [organisation]' (interview B1). Moreover, which criteria should professionals use to decide on the issue? The inscribed urgency classification causes confusion: 'When I send a low level signal, what does that mean? […] Are the criteria to choose a signal – low, high or urgent – the same for everybody? Are there standards for that?' (interview C1). In addition to professionals' doubts about the aim and added value of the system, they find it complicated to assess risk because they experience their concerns as rather subjective and developing in time. A welfare worker explains,

> 'How to measure [concern]? […] partly that is just subjective […] More often [a report] is some sort of summation […] that is a process that not always starts on Monday and is finished on Wednesday […] concern also arises over time' (interview P1).

The local Child Index does not offer a definition of risk or risk assessment criteria. However, as professionals expressed a need for more guidance in practice, organisations developed their own 'user protocol', 'manual', 'regulation', 'procedure', 'work instruction' or 'guideline'. As a result, some organisations agreed to put all of their clients in the Child Index, whereas others developed certain definitions to assess risk. A manual for youth nurses and physicians states, 'A signal registration is about "*children of concern*" in which […] a *direct health threat exists* for the child.' Professionals working at organisations that did not provide any guidance on risk used the index at their own discretion. Although the local index was purposely introduced without a clear definition of risk, local use resulted in various constructions of risk in practice.

Complementarily, the rise of the national Child Index system, which created a network of Dutch youth workforce professionals by connecting all local indexes, induced new translations of children at risk. The accompanying national Act prescribes that a youngster should be signalled in the index when there is a 'reasonable suspicion [that] the youngster is actually being threatened by one or more of the risks as formulated hereafter, in the necessary conditions for a healthy and secure development to adulthood.' (Eerste Kamer, 2008–2009, p.5). Whereas the local system distinguishes two options for putting at-risk children in the system – a chain registration for a child already in care or a signal for a child not yet in care – the national system only recognises the latter. In addition to this technical difference, the national system was introduced with its own terminology. The accompanying handbook 'Linguistic uniformity' defines signalling a child at risk as 'reporting', a term that was explicitly not recommended for use on a local level (TNO, 2007). Although the Dutch government commissioned the development of the handbook to ensure that all professionals use the same terminology, in local practice, the terms signalling and reporting became even more mixed-up than before. A regional index manager explains, 'there really is a lot of confusion about that […] all those terms and some terms mean something totally different in social service country' (interview L1). According to some professionals, the confusion creates risky situations because some index users confuse a 'report' of an at-risk child in the index with a formal 'report of child abuse' to the Advice and Reporting Centre on Child Abuse, which is significantly more serious:

> '[Something I] recently overheard: they had sent a signal with the idea that an official report to the Advice and Reporting Centre on Child Abuse had been made. I think that is very alarming […]. Because if one has have the idea that one is reporting [abuse] by signalling […] that is awful, then nothing happens with [the signal]' (interview J2).

In addition to other terms, the national index's statutory regulation affected professionals' perspective on children at risk because the Act includes a definition of 12 specific 'risks', such as 'the youngster becomes involved with criminal activities', 'the youngster has more or other financial problems than usually occur at his/her age' or 'the youngster is exposed to risks that occur disproportionally in particular ethnic groups' (Eerste Kamer, 2008–2009, p.5). These broadly formulated risks are intended to inform professionals when a child should be signalled in the index. 'It is therefore not possible to report youngsters on the basis of different risks than those formulated in the Act. This is also called a closed system of risk.' (Meldcriteria.nl, 2010). This legal arrangement, including risk definitions, strengthened the ICT system's association with signalling risk instead of stimulating multidisciplinary collaboration. High-profile incidents with children in the past, followed by public inquiries, already intensified organisations' fear to err and be held accountable. Because municipalities are legally bound to facilitate local indexes, policymakers promoted usage. An alderman stresses the importance of early signalling, 'You do it to detect the risks of children. The more, the better, the merrier' (interview M1). To prevent reputation damage in the case of incidents, meet national regulations and maintain the (financial) relationship with the municipality, organisations' managers stimulated their employees to signal risks. Moreover, because risk reports are a necessary condition to making the ICT work, some organisations made professionals participate in extra training sessions on 'early signalling', teaching them how to assess risk signals. As a consequence, professionals' need to safeguard themselves and use the index as prescribed in the law increased. Furthermore, professionals made risk signalling an end itself, instead of a means to help at-risk children.

To operationalise the twelve risks defined in the Act, the Ministry of Youth and Family also launched the national 'Report criteria' in the form of a website and booklet. 'In this outreach the risks formulated in the Act are clarified by providing concrete examples per risk formulated in the Act.' However, it is also stressed that 'No simple instruction can be provided on when reporting is allowed or not, each situation is unique and every time the reporter will have to make his/her own professional judgement.' (Meldcriteria.nl, 2010). As the local index induced professionals' need for a more clear construction of risk, many organisational managers adopted the national criteria to support their employees. As a result, national criteria booklets were distributed locally, and references to the national website were included in organisational guidelines. While some professionals use the national criteria to assess children at risk, many ignore them because they are considered 'fairly abstract' (interview A1), 'too comprehensive' and 'not concrete enough' (interview L1), turning every child into a child at risk. Although designed as a support tool, the national criteria made the construction of risk more diffused and the status of a signalled risk disputed as it might be based on the national criteria.

In practice, the Child Index evolved from a local system allowing for signalling risks based on professional judgement into a legally obliged national tool in which professional discretion was diminished through standardised, yet vague, notions of risk. Local systems vary regarding their additional functionalities, but they all contain the basic functionality of signalling children at risk. The national index is simpler than local indexes in the sense that it only focusses on sharing risk signals. It serves as a national tool that interconnects all local systems' risk signals and does not contain additional functions. However, our analysis shows that, regardless of local systems' additional functions, the introduction of the national index further complicated professionals' construction of children at risk at the local level.

Professionals' struggles with the local index are also affected by the social–political context in which it is introduced. Municipalities that use the same local index can be heterogeneous with respect to size, the degree of political commitment, collaborative structures, authorised organisations, culture, youth problems, youth policy focus, and the date the index started being introduced. However, these differences between

local contexts did not appear to be relevant to understand the patterns that dominated the construction of risk in the making of the Child Index. Despite the heterogeneity in the local contexts we studied, our data-analysis demonstrated that the interplay between the local and national index added to the complexity of risk construction and that the index struggled to function properly in all municipalities.

4.2. Multidisciplinary collaboration and the fragmentation of risk

Although sometimes described as a simple database to record children's risk signals, originally, the system was designed to stimulate multidisciplinary collaboration among professionals involved with a particular at-risk child. To achieve collaboration through this ICT tool, different disciplines and various organisations were connected and authorised to use the Child Index. As soon as the system contains two or more digital risk signals on one particular child, i.e. a 'match', the system automatically sends an email to each signaller, informing them about each other's involvedness. Subsequently, professionals should contact each other to discuss the at-risk child and collaborate if needed.

The Child Index requires professionals to decide whether a concern should be translated into a digital risk signal. However, professionals' different institutional goals and tasks influence how they perceive risk. In addition, professionals' different relationships with children and their parents contribute to different perspectives on risk. A teacher, interacting longitudinally with many children, might see ups and downs without defining them as 'risk'. A youth worker who works with street kids may see progress where others see huge risks. Anticipating these disciplinary differences, the local Child Index allows different roles for different institutional domains. Technically, a distinction was made between signalling and registering organisations. Organisations that see children on a regular basis but do not provide care, such as schools and day cares, frequently called the 'discovery-sites' of at-risk children, are only enabled to signal risks to the system, whereas professionals in care organisations are authorised to put their clients in the system via chain registrations as well. Although this technical distinction was supposed to accommodate the disciplines involved, in practice, it reinforced the differences between perspectives on signalling risk, further complicating the use of the system. In addition, some disciplines consider maintaining a relationship with youngsters crucial. Signalling a risk may damage that relationship, as a youth worker told us: 'Currently, it is just very difficult for us to say that we are going to signal in that system, as a result of which we risk losing sight of a youngster.' (interview F2). A youth nurse explains:

> 'How you look at such a system; that depends on issues such as privacy, how do I tell the parents? Will I lose parents' trust by telling them? These types of questions determine whether you signal, yes or no […]. Everyone has their own opinion about it, but also their own perspective.' (interview B1).

Similarly, the fear of damaging relationships with children and parents prevents schools from using the index. Disciplines' different perspectives on signalling risk come to light in the quantitative management reports. Once connected to the index, 'discovery-site' organisations hardly use the index. Instead of simplifying risk signalling, the two different functions to put at-risk children in the local ICT system stimulate fragmentation. In this way, disciplinary differences prevent the system from creating an overview of professionals involved with an at-risk child (cf. Peckover et al., 2008).

Professionals' conceptualisations of risk are further influenced by their view on privacy. Already during a pilot with the local index, disciplinary differences regarding privacy provoked many discussions. In particular, medical professionals opposed signalling risks because it might breach professional confidentiality. Similar concerns arose with the introduction of the national Index. Several measures were taken to accommodate disciplines' varying privacy considerations and to remove privacy concerns. The local index's project team performed an extra legal test and developed privacy protocols, and the Dutch government built a clause on authorisation into the national Act and launched a national online 'privacy roadmap'. Despite these efforts, in practice, privacy considerations continued to affect professionals' perspectives on how to address risk. Encouraged by the Dutch federation of medical practitioners, which advised physicians to restrict index use, limit it to health risks and ask for consent[5] (KNMG, 2010), many medical professionals, including GPs, mental healthcare providers and youth physicians, decided to very cautiously signal children at risk or to completely decline a link to the index. Similarly, the preventative role of the index is disputed. A welfare worker explains,

> 'The other day I had a discussion with someone from the police who says […] you can better report ten too much, than one too little […] But people also have the right […] to the benefit of the doubt […] do you see a parent who is a threat for the development of her child or do you see someone who just has had enough for a while?' (interview P1).

Powerful differences in risk perception in the context of privacy, prevention and care relationships made risk signals disputed and drew more attention to disciplinary differences than collaboration. As a result, disciplinary differences regarding risk and privacy affected authorisation of use as well as use in practice. Providing tools, instructions or protocols could not overcome this difficulty:

> 'How do you ultimately translate that protocol, that work instruction, what does it mean in practice? Does it mean that when a child with an eating disorder is sitting in front of me that I have to signal that? Or what does that mean when I have a child in special education […] when do we raise which flag?' (interview H3).

Over time, professionals' confusion introduced more doubts about when to use the local index and which of the earlier mentioned urgency codes to choose given a certain concern. The distinction of low, high and urgent risk contributed to miscommunication and frustration in the case of a match because disciplines have different expectations about how to deal with high- and low-risk cases. The local steering committee decided to solve this problem by abolishing the urgency codes completely, only requiring professionals to decide whether to enter a signal or not.

In this way, disciplines' various perspectives on risk shaped the way the Child Index was used, who could use it, and its technical functionalities. Despite these changes, each digital risk signal in the Child Index continues to be stripped from the contextual information that is relevant for a specific discipline to interpret its relevance. As a result, for many professionals, the status of a signalled risk lacks credibility.

Disciplinary and organisational differences on risk shape and are shaped by the Child Index. In the process, the Child Index developed from a tool designed for all disciplines of the youth workforce with a focus on matching all types of risks to stimulate collaboration to a tool adapted to accommodate disciplinary differences regarding risk that is actually being used by a limited group of disciplines. During this process, the credibility of signalled risks was not increased.

5. Discussion

The importance of early signalling risks and organising multidisciplinary collaboration to prevent problems among children is widely supported by professionals and policymakers in child welfare. Therefore, the introduction of the Child Index carried high expectations. Although the ICT of the Child Index is officially and legally in place and much work has been done to make professionals signal at-risk children

[5] Professionals are legally obligated to provide information to parents and/or children before signalling risk, but do not need consent to make an entry in the index.

early, the definition of a child at risk and when to signal risk has been the object of continuous discussion among professionals.

In this paper we use the concept of co-production to analyse the introduction of the Child Index. It helps to show that the Child Index technology and the risks to be signalled are being constructed in parallel. However, in practice the Child Index system appears not to function as intended and expected by policymakers. After elaborating on the fruitfulness of our analysis in terms of co-production, we will discuss the usefulness of this concept to study an unsuccessful technology such as the Child Index in the light of Latour's example of the failed technological project Aramis.

The process of co-production of the Child Index and risk simultaneously influences both goals of the Child Index. First, the Child Index was intended to signal all children at risk to prevent future tragedies and eventually provide good care. The introduction of the local Child Index made explicit that disciplines constructed risks differently. The introduction of the national index responded to that with various attempts to standardise risk, which implied that professional discretion was diminished; however, the status of a signalled risk remained controversial and lacked credibility. Second, the Child Index was designed to stimulate multidisciplinary collaboration by matching the risk signals of all disciplines and organisations working with children. To collect all risks of a child in one system, many organisations were authorised to signal risks. Once introduced in practice, the system's lack of sensitivity to disciplinary and organisational differences regarding risk induced much resistance and limited professional usage. Various attempts to accommodate the system to these differences stimulated the tendency to work around or to reject use of the index.

Previous studies on ICT, risk and child welfare warned us about the consequences of youth policies' focus on risk and criticised the introduction of ICT in child welfare because it would not fit analogue professional practices. In particular, ICT's potential to introduce new risks and stimulate surveillance and control in child welfare is frequently stressed (Hall et al., 2010; Keymolen & Broeders, 2013; Parton, 2008b; Peckover et al., 2008). However, in most of those studies the mutual interaction between the ICT system and professional practices has not been studied. By separating the ICT from professional practices and by taking technologies' successful introduction for granted, it is often argued that ICTs will actually discipline professionals and thus determine their construction of children at risk. Our analysis of co-production adds to previous research by providing insight into the interaction between ICT and professionals in practice. It shows that professionals do not adopt the Child Index's instructions indiscriminately, thereby stimulating – although unsuccessful – changes in the system. In practice, the index does not discipline professionals to signal children at risk, which prevents the index from running smoothly.

When interpreting technologies in terms of socio-technical hybrids, like Parton (2008a) suggested, the case of the Child Index can be characterised as an unstable hybrid that did not achieve its goals as expected. Currently, policymakers and professionals blame each other for the Child Index's lack of success. We showed that the Child Index technology and children at risk are co-produced, shaping each other in a continuous process of socio-technical interaction. Despite these acts of co-production, the introduction of the Child Index hardly can be seen as successful.

Although this study focused on one specific local index, we consulted documents about other local variants of the system and talked to several stakeholders engaged in similar processes in other regions to sensitise for relevant differences between local systems. Following other indexes at a distance this way, provided us with indications that the dynamics and issues we encountered also play a role in the introduction of other indexes. Moreover, the findings of our analysis are in line with issues pointed out in local and national evaluation reports on the Child Index (e.g. Abraham, 2012, 2015; Dona, 2013; Hoogtanders, Peters, & Thomassen, 2011) as well as findings of previous studies on the similar system ContactPoint conducted by researchers from the UK (e.g. Hoyle, 2010; Parton, 2008b; Peckover et al., 2008). Although studying different variants of the Child Index system, they all discuss why this ICT tool does not function in practice as intended. In STS the notion of co-production is often associated with successful technologies (cf. Jasanoff, 2004; Latour, 1987). How can we understand that processes of co-producing ICT and risks do not result in a successful ICT tool?

According to Latour's (1987) actor network theory, technologies stabilise by building social networks entailing both human and non-human actors. The more actors there are enrolled in the network, the stronger and more vital a network becomes. In other words, a technology cannot become successful in the context of a weak, unstable, limited or fragmented network. Latour's story about the failed technology Aramis (Latour, 1996), a new transportation system developed in Paris that was never implemented, shows that a technology can only survive and become successful when actors manage to sustain it. Without enough room to communicate, negotiate, compromise, and adapt to changing social contexts, cohesion between the technology and its actors cannot increase and the project will fail. Or in terms of Latour: without enough love, a technological project will die. In this light, it could be discussed whether the Child Index network enables important actors and actants to nurture the love between them, enabling this new technology to function in practice.

Although policymakers and implementers attempted to introduce an ICT tool to prevent children at risk from falling through the nets of care, the Child Index network that has been build is (still) not strong enough to make the system function as intended. The development and introduction of the Child Index is characterised by very limited professional engagement, not to mention limited involvement of parents or children. This process produced not only allies but also many enemies. Illustrative for the lack of communication and engagement of relevant actors in the Child Index's process is the fact that professionals only have to inform parents and/or children before signalling risks in the index, but do not need their consent (see footnote 5). Building a network without enrolling all relevant actors hampers the production of allies, which prevents a network from becoming strong and vital enough to make a technology successful. Additionally, because the Child Index system fully depends on the input of risk signals to function, limited use produces a downwards spiral, convincing other professionals to also not use the index. Although elements of a Child Index network can be observed in practice, such as the Child Index technology accompanied by its criteria, manuals and regulations, and professionals' constructions of children at risk that help them to decide which children need help, the connections between those parts remain fragile at best. Despite co-production between and within different elements of the Child Index network, the cohesion between the technology and its social actors remained weak. This limited cohesion prevents the network from stabilising.

Akrich (1992) has argued that the more material an innovation is, the more difficult it is for users to act against it and the easier it stabilises. The material part of the Child Index project is rather strong and stable as it is in place and laid down in a national law. As a result, the co-production between the technical and the social elements of this project becomes asymmetrical. On the one hand, the legally enforced materiality of the system enforces professionals to relate to it and prevents professionals to actually change the technology. On the other hand, the technology is not dominant enough, allowing professional resistance, non-use and workarounds (cf. Lecluijze et al., 2014, 2015). The ICT system still depends on professional risk construction, but this risk construction is the main bottle neck for professional use of the system. Latour's story of Aramis shows that a technology needs 'love' to flourish. Our study shows that regarding the Child Index project one could speak of enforced love. Through inserting the Child Index into the Youth Act policymakers enforced actors to implement and use a local index system. The Aramis project eventually died, but as long as this legal arrangement is in place the Child Index project cannot stop.

As such, the Child Index is having a merely rhetoric function: the distance between ideal and practice is increasing but it is impossible to accommodate this in practice.

Moreover, during the implementation of the Child Index Dutch policy introduced major changes in child welfare, such as decentralisation of care, huge budget cuts, and a new focus on normalisation and de-medicalisation, thus, the index did not have much time to stabilise. Although the Child Index's focus on children at risk does not fit the intended changes of the child welfare system, the Child Index is still part of the new Youth Act that became effective on January 1st 2015. In the context of the changing youth care system, the national index system will be expanded with a 'family module' that allows for matching the risk signals of siblings. Many municipalities limited the functionality of the system, for instance by dropping the 'signalling' function and only use the 'chain registrations' of children already in care or by leaving the system asleep. However, as long as the Child Index exists and is legally obligatory, it can be expected that the technology and professionals' notion of a child at risk will be affected by each other.

6. Conclusion

The Child Index was designed and introduced to identify children at risk and to stimulate multidisciplinary collaboration. Analysing the Child Index in terms of co-production shows that the Child Index technology shapes professionals' constructions of children at risk and vice versa, and this interaction results in a system that does not work as intended. The Child Index's preventive ambition of early signalling of all children at risk is not fulfilled. Although this paper shows that the Child Index does not result in docile professionals or digital at-risk children on a large scale, it does indicate the need to discuss whether the risk signalling ambitions and magic bullet representations of ICT are not a risk to children's welfare. Although the Child Index might not have done serious damage, children's benefit from the index and all the work performed is disputable. Taking into account that professionals' first love is the best interest of and care for a child, it is recommended for policymakers to provide enough room for the 'love' between future technologies and their social actors to flourish. Without actors' engagement, room to experiment and opportunities for collaborative learning new technologies become at risk.

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